

WHAT IS CLAIMED IS:

1. A method for fabricating a transmission balanced photomask, the method comprising:

5 forming an alternating aperture phase shifting photomask pattern on a substrate having trenches formed therein and the substrate having an index of refraction; and

10 forming a layer of transmission balancing material over the substrate, the transmission balancing material having an index of refraction greater than the index of refraction of the substrate.

2. The method of Claim 1 wherein the transmission  
15 balancing material further comprises spin on glass (SOG).

3. The method of Claim 1 further comprising  
overcoating the transmission balancing material on the  
substrate.

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4. The method of Claim 1 further comprising the layer of transmission balancing material having an index of refraction greater than 1.5.

25 5. The method of Claim 1 further comprising the layer of transmission balancing material having an index of refraction approximately equal to 2.0.

30 6. The method of Claim 1 further comprising planarizing the transmission balancing layer.

7. The method of Claim 6 further comprising planarizing the transmission balancing layer using a chemical mechanical polishing (CMP) technique.

5 8. The method of Claim 1 further comprising forming an antireflective layer on the transmission balancing layer.

10 9. The method of Claim 1 further comprising attaching a pellicle over the transmission balancing layer.

15 10. The method of Claim 1, wherein forming the transmission balancing layer comprises using a technique selected from the group consisting of physical vapor deposition, chemical vapor deposition, and gas phase deposition techniques.

11. A method for fabricating a phase shifting mask,  
the method comprising:

providing an etched transparent substrate having a  
recessed transmissive portion, the etched substrate  
5 having a first refractive index;

depositing an absorber layer on the etched  
substrate;

patterning the absorber layer; and

forming a transmission balancing layer on the  
10 resulting patterned absorber layer, the transmission  
balancing layer having a second refractive index greater  
than the first refractive index.

12. The method of Claim 11, further comprising  
15 planarizing the transmission balancing layer.

13. The method of Claim 11, wherein the  
transmission balancing layer comprises spin-on glass  
(SOG).

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14. The method of Claim 11 further comprising the  
transmission balancing layer having an index of  
refraction greater than 1.5.

25 15. The method of Claim 11 further comprising the  
transmission balancing layer having an index of  
refraction of approximately 2.0.

16. A phase shifting mask, comprising:  
an etched transparent substrate including a recessed transmissive portion;  
a patterned absorber layer deposited on the  
5 substrate; and  
a transmission balancing layer formed on the patterned absorber layer, the transmission balancing layer operable to retain refracted light within recessed transmissive portion.

10 17. The phase shifting mask of Claim 16, wherein the substrate has a first refractive index and the protective layer has a second refractive index greater than the first refractive index.

15 18. The phase shifting mask of Claim 16, wherein the transmission balancing layer comprises spin-on glass (SOG).

20 19. The phase shifting mask of Claim 16, wherein the substrate comprises quartz.

25 20. The phase shifting mask of Claim 16 further comprising the transmission balancing layer having an index of refraction approximately equal to 2.0.

21. A method for fabricating a phase shifting mask,  
the method comprising:

providing an etched transparent substrate having a  
recessed transmissive portion;

5 depositing an absorber layer on the etched  
substrate;

patterning the absorber layer; and

forming a transmission balancing layer on the  
resulting patterned absorber layer, the transmission  
10 balancing layer having a refractive index greater than  
the refractive index of air.

22. The method of Claim 21, further comprising  
planarizing the transmission balancing layer.

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23. The method of Claim 21, wherein the  
transmission balancing layer comprises spin-on glass  
(SOG).

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24. The method of Claim 21 further comprising  
forming the transmission balancing layer using a  
technique selected from the group consisting of vacuum  
evaporation, magnetron sputtering, ion beam sputtering,  
and chemical vapor deposition.